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ABSTRACT

This case study examines the history and current circumstances of education in Cocke County (Tennessee) in the context of its participation in the Appalachian Rural Systemic Initiative (ARSI), which aims to improve science and mathematics achievement through systemic reform. Sections of this report describe the county's history, demography, and economic condition; the school system and its involvement with ARSI; and the presence or progress of the National Science Foundation's "six drivers of educational system reform": implementation of standards-based curriculum, supportive policies, convergence of resources to support math and science programs, broad-based parent and community support, improved student achievement, and improved equity of achievement. The county lies against the Smoky Mountains in rural east Tennessee and has a 25 percent poverty rate, relatively low educational attainment, and few desirable employment opportunities for high school graduates. The school system serves approximately 4,500 students in eight K-8 elementary schools, a high school, and a K-12 school. ARSI attempts to build on local efforts to improve math and science education by providing professional development, technical assistance, and connection to "resource collaboratives" at regional universities. The district integrated ARSI activities with its 5-year improvement plan to meet state standards, implement a standards-based curriculum, and address perennially low math scores. Evaluators found moderate evidence of developing success on the six drivers of reform. District staff considered ARSI's professional development to be valuable. There were no consistent improvement trends in average test score gains in math and science. (SV)

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A Case Study of the Cocke County (TN) School System

Prepared

for

The NSF Rural Systemic Initiatives Evaluation Study

by

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Jerry G. Horn

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Foreword

On behalf of The Evaluation Center at Western Michigan University and the site visitation team for the NSF Rural Systemic Initiatives Evaluation Study, I want to express gratitude and appreciation to the officials of Cocke County (Tennessee) School District for their willingness to include this community in our study for the National Science Foundation. First, Superintendent Larry Blazer approved the visit for the district, participated in early planning for the study-visit, and opened the district to our formal visit. Further, each principal committed time for interviews and visits to their schools, and we appreciate their candor and openness as they reflected on both problems and successes. Individual teachers, as well as the network of building-level Teacher Partners, allowed us to visit their classrooms and talked with us about their experiences related to the Appalachian Rural Systemic Initiative involvement and impact in this school district. To Missy Biddle, we express our appreciation for the time she committed to our visit and her willingness to share with us her experiences as the district-level Teacher Partner. We particularly appreciated Peggy Hammond's excellent coordination of the study visit as well as her orientation of the team to the community. Also, she and all other personnel in the district with whom we interacted made the team feel welcome, and we will always remember this visit as a very positive professional experience.

We hope this report provides a fair and accurate description of the community, school, and efforts to provide a quality education for the students of this county. Certainly, there are challenges and disappointments in some cases, but we acknowledge the time and effort that many professionals are providing to meet the student needs of this community.

Lastly, I want to thank study team members Daniel Stufflebeam and Steve Oliver for their professional expertise and effort and the extensive and positive contributions they made in the development of this report.

Jerry G. Horn
Principal Research Associate

A Case Study
of the
Cocke County (TN) School System and Its Role as a Partner in the
NSF-Supported Appalachian Rural Systemic Initiative

Cocke County is located directly against the mountain range that became the western boundary of North Carolina and the edge of the East Tennessee Valley. Before it was formed as Cocke County, the area received its share of emigrants down the valley from Virginia and over the mountains from North Carolina. According to a Chamber of Commerce booklet,

> Few states in the American Union can boast of a more colorful or more significant history than that of Tennessee and none more interesting than the early history of Cocke County.
>
> Once a part of North Carolina, called the State of Franklin, then a part of Jefferson County, Tennessee, Cocke came to its own in 1797 and was named after William Cocke, a political figure who was instrumental in forming this part of East Tennessee. The history of Cocke County really begins soon after the first treaty with the Cherokee Indians and the English in 1721. The stories of virgin forests, great rivers and streams, and rich bottom lands were carried back to Pennsylvania, Vermont, the Virginias, and North Carolina by early discoverers. This began the movement of adventurers, hunters, and homesteaders, looking for fertile farmlands and new settlements.

Cocke County was once home to the Cherokee Indians before their removal to Oklahoma in 1838, along the infamous "Trail of Tears." In Oklahoma, the Cherokees became known as one of the "five civilized tribes" and have become one of the most respected and powerful tribes. The Cherokees who chose not to accept the "offer" to leave the area were allowed to remain, and many eventually gained legal ownership of land now known as the Cherokee Indian Reservation located near Cherokee, North Carolina.

Many of the early settlers in Cocke County were of Scotch-Irish descent, and they were known as roamers and adventurers. These settlers were poor; with little more than the clothes on their backs, a rifle, an ax, gunpowder, and cooking pots, they began to carve out homes in some of the most rugged and isolated lands possible. But they found individual freedom and a place of their own in the process. They cleared trees from rich lands to be farmed later, and they cut trees, constructed log cabins, built churches and schools, and developed towns.

Like many pioneer settlements, towns developed along rivers or waterways that would provide power for mills, as well as transportation to and from the area. While some of the goods and merchandise to support the early settlements were brought by wagon or pack animals from Richmond, Virginia; Philadelphia; and New York, as well as by water, it was slow and costly.

After some time, the railroad was extended to the state, but it was more than 20 years later that Cocke County gained access to it. The railroad was used primarily for military purposes during the Civil War and survived considerable financial difficulties. Then the North Carolina legislature directed the warden of the state penitentiary to use convict labor to upgrade and extend the line from the east (North Carolina) and over the mountains. After several years of backbreaking convict labor, the loss of a considerable number of lives (both civilian and convict), and the expenditure of much money to tunnel through the mountains, carve railroad beds out of the sides of mountains, and clean up after landslides, the line finally crested the Blue Ridge and was later connected to the western link at the Tennessee state line.

While the railroad cost the lives of more than 500 persons (mostly nameless convicts), it provided a means for economic growth in the area, such as the vegetable and produce business started by the John Stokely family in the 1800s. This family business grew to include a cannery and the purchase of the Van Camp Company in Indianapolis. The company grew into a multimillion dollar enterprise over time, and even today Newport, the county seat for Cocke County, is heavily involved in the food processing business. However, additional industries—e.g., chemical, furniture, automotive, and electronics—were added to the economic base of the community in later years. Today it is recreation and tourism that are emerging as major components in the economic structure of the county and its residents.

During the Civil War, the people of the area suffered physically and emotionally. To some, it became known as "The Brothers' War," and it split families along ideological, religious, and economic lines. It was not unknown to find one brother of a family wearing the blue uniform of the Union, another brother wearing the gray of the Confederacy, and neighbors fighting neighbors. It is from the Methodists of East Tennessee, who took a stand against slavery, and the support and influence of the Quaker and Presbyterian faiths that the "volunteers" of Tennessee became a reality for the Union. After the war ended, it took several months for the word to reach some of the Tennessee companies. Then families put back together their lives, lands, and homes that had been figuratively and literally pillaged by the war efforts of both sides.

As was true with most advancing settlements, farming provided both the food for the families and income for other necessities. While Cocke County has a beautiful setting between the mountains and as the entrance to the Great Smoky Mountains, it provided challenges for transportation and movement of goods and services over the treacherous mountain roads. Thus, each community, such as Newport, Cosby, Hartford, Del Rio, etc., developed its own enterprises to support the needs of its citizens. Craftsmen of country-type furniture, musical instruments, and other objects are a part of the tourism economy of today. Farming is of less importance or not as essential to individual families as was true in the past, but the growing of corn and tobacco is still a major enterprise of the many small farms of the area. Although the railroad was a long time coming to the area, when the line was completed, it provided access to eastern lumber markets. Hogs were moved to market in a unique way. It is said that the county was known for its "hog driving." Apparently, hogs were grown in abundance in the area, and they were driven on foot over the mountains to Asheville (North Carolina) by drovers who fed them with corn purchased along the

route. Since hogs could travel only 8 to 10 miles per day, "hog stands" were established to accommodate the hogs and the drovers for overnight stays.

While schools were built in virtually every community, some of the first teachers came over the mountains (from North Carolina) to teach in missions or in the churches that dotted the landscape. Oftentimes, the teachers rotated their residence among the families of the children, and this became one way in which many of the adults learned to read and write.

The oldest city in Cocke County and the third oldest in Tennessee is Parrottsville. It was formally established as a city by the Tennessee legislature on October 9, 1797. The settlement began as a 640 acre grant to John Parrott and his four brothers for their services during the Revolutionary War. The John Parrott family came to the area from Virginia, but the Parrott ancestry can be traced to northeast France (the Alsace-Lorraine area). Other early residents' ancestry includes German, French Hugenot, and Irish. Typical of Parrottsville and most other communities of the area, these European immigrants brought exceptional farming knowledge and skills to the new lands, as well as skilled craftsmanship in a variety of areas.

Nestled up against the Smoky Mountains, Cocke County has an area of 434 square miles and a population of about 31,500 (1996 estimate). There has been a slow but steady growth in the population from 23,000 in 1950. Newport is the county seat, with an estimated population of 8,543 in 1996. Newport's population growth mirrors that of the county over the past 50 years.

Cocke County is located almost halfway between Chicago, Illinois, and Tampa, Florida; and it is becoming an attractive area for retirement due to location, no state income tax, quiet pastoral setting and "laid back" lifestyle, low cost for housing, and generally low cost of living. At the same time, there are many opportunities for a variety of recreational activities, i.e., fishing, camping, whitewater rafting, canoeing/kayaking, boating, etc. In recent years, the nearby Gatlinburg/Pigeon Forge/Sevierville area is developing as a major recreational/vacation/ entertainment center for eastern Tennessee and the entire state and region. Spurred by the development of "Dollywood" and the national/international recognition of Sevier Country native, country singing star Dolly Parton, the area provides employment for many Cocke Country residents in seasonal tourist-related jobs as well as in other jobs that provide goods and services in support of the industry.

Following are examples of some of the advertised community events in the county:

April (third weekend)	Arts and Crafts Guild Spring Show
May (1st Sunday)	Ramp Festival
(Beginning Memorial Day)	Whitewater Rafting on the Pigeon River
June (1st Saturday)	Bluegrass Jam
(2nd Friday and Saturday)	Annual Dulcimer Festival
August (2nd through 3rd Saturday)	Cocke County A & I Fair
October (2nd weekend)	Parrottsville Heritage Days

December (Entire month)	Historical Tours
(31st)	New Year's Eve Party

Newport is strategically located about one hour's drive from Knoxville (Tennessee) and Asheville (North Carolina) via Interstate 40. Other major highways serving the county and Newport are U.S. 321, which takes you to the Great Smoky Mountains National Park, and U.S. 25/70, which takes you through the Cherokee National Forest. Numerous other roads wind themselves through the mountains alongside the streams and rivers in the county. These roads have been traveled for many years, and while they take you through scenic areas, one must recognize the relative isolation that early residents must have experienced, the poverty that developed and still exists today, and the presence of infamous "moonshiners" and illegal stills that operated in the hills and "hollers" of the area.

Except for those in Newport, there are few companies other than home-based cottage industries that provide substantial opportunities for employment. Some of the major local industry entities are listed below:

ACE Products, Inc. (rubber products)–193 employees
Detroit Gasket (international gaskets)–222 employees
Electro-Voice, Inc. (PA systems, speakers)–169 employees
Hunt Foods Company (Van Camp/Wolfe products)–564 employees
Falcon Products (restaurant furniture)–430 employees
Sonoco Products (paperboard, cores)–248 employees
Spring Arbor Distributors (distribution of Christian publications)–303 employees
Wood Products (wooden furniture turnings)–100 employees

Only 2 of almost 30 of the largest private sector employers (ACE Products, Inc. and Hunt Foods Company) have a union affiliation.

The annual average employment status for Cocke Country (based on 1996 data) is

Civilian labor force	17,000
Unemployed	1,760
Employed	15,240

In 1995, the county had retail sales totaling $185,153,000 and an average per capita income of $14,139 in 1994. The weather conditions are termed "mild," with a monthly average high temperature of 48 degrees in January and 88 degrees in July and a monthly average low temperature of 26.1 degrees in January and 64.6 degrees in July. The average precipitation is 44.72 inches with an average snowfall of 12.7 inches per year. The mean length of a freeze-free period (days) or growing season is 180 days.

Other statistics, based on 1990 U.S. census data, of the people and the socioeconomic status of Cocke County are summarized below.

Total Number of Persons (population) 29,141

Total Number of Families 8,483

Total Number of Households 11,191

Sex

- Males 14,035
- Females 15,106

Race

- White 28,398
- Black 613
- American Indian, Eskimo, or Aleut ..... .78
- Asian or Pacific Islander 31
- Other race 21

Age

- Under 5 years 1,714
- 5 to 18 years 5,756
- 65 years and over 3,750

Ancestry

- Single Ancestry 18,684
- Multiple Ancestry 4,401
- Ancestry Unclassified 850

Place of Birth

- Born in State of Residence 24,687
- Born in Other State in the U.S. 553
- Born Outside the U.S. 83
- *(74 were born abroad of American parents)*

Residence in 1985
- Same House in 1985 17,648
- Different House in 1985
  - Same County 6,967
  - Different County
    - Same State 1,309
    - Different State
      - Northeast 80
      - Midwest 321
      - South 983
      - West 119
- Abroad in 1985 16

Place of Work–State and County Level
- Worked in State of Residence
  - Worked in County of Residence 7,986
  - Worked Outside County of Residence 4,066
- Worked Outside State of Residence 146

School Enrollment and Type of School (3 years and over)
- Enrolled in Preprimary School
  - Public School 201
  - Private School 48
- Enrolled in Elementary or High School
  - Public School 4,853
  - Private School 54

Educational Attainment (Persons 25 years and over)
- Less Than Ninth Grade 5,838
- 9th to 12th Grade, No Diploma 3,483
- High School Graduate (includes equivalency) 6,022
- Some College, No Degree 1,930
- Associate Degree 459
- Bachelor's Degree 737
- Graduate or Professional Degree 320

Class of Worker (Employed persons 16 years and over)
- Private For-Profit Wage and Salary Workers 9,675
- Private Not-For-Profit Wage and Salary Workers 443
- Local Government Workers 831
- State Government Workers 282
- Federal Government Workers 196

Self-Employed Workers 893
Unpaid Family Workers 154

Median Household Income in 1989 . . . . . $16,818

Median Family Income in 1989 . . . . . $20,644

Social Security Income in 1989 (Number of households)
With Social Security Income 3,312
No Social Security Income 7,870

Public Assistance Income in 1989 (Number of households)
With PA Income 1,606
No PA Income 9,576

Poverty Status in 1989 (Persons)
Above Poverty Level . . . . . 21,517 (75 percent)
Below Poverty Level . . . . . 7,273 (25 percent)

Median Value of Owner Occupied Housing Unit $40,300

Extreme Values of Housing Units (Number of units)
Less than $15,000 508
Greater than $99,999 182
Greater than $199,999 24

Kitchen Facilities in Housing Unit
Complete Kitchen Facilities 11,862
Lacking Complete Kitchen Facilities 420

Plumbing Facilities in Housing Unit
Complete Plumbing Facilities 11,474
Lacking Complete Plumbing Facilities 808

While there are no institutions of higher education in Cocke County, there are a number of colleges and universities in eastern Tennessee that are not far from the county seat of Newport.

Carson Newman College (Jefferson City)—35 miles
University of Tennessee (Knoxville)—50 miles
East Tennessee State University (Johnson City)—70 miles
Walter State Community College (Morristown)—18 miles

The predominant impression of geography is one of mountains, many trees, and a few streams and rivers, with widely dispersed housing. While there are a number of industries in the area, several appear to be moving or there are rumors about them moving to new locations outside the county. Like many areas that once depended on farming as an economic base, family farming in Cocke County seems to be a thing of the past. Marginal profits, if any, are reported from family farms; and with the demise of tobacco as a lucrative crop, the future is even bleaker. However, the recreation and tourism industry is expanding, and it provides considerable employment in low-paying jobs. There are few desirable employment opportunities for high school graduates, which does not encourage them to remain in the area.

Main roads and highways are well maintained, and they take you by a mixture of housing that probably reflects the varied income levels of the area. But off the main roads, you see evidence of the poverty that prevails in this county and others in the Appalachian area. Overall, the population of Cocke County is predominantly of low income, relatively low educational levels, and white. There is a strong religious orientation in the area, with prevalence of Baptists and Baptist churches.

Generally, one gets the feeling that the area is orderly, relatively safe, and essentially devoid of extensive substance abuse and crime problems associated with low-income areas in urban areas.

Over the years, from the time of new settlements with individual schools (often one-room, multiple level elementary schools) to the time of several separate school systems (one per any town of a reasonable size) to the eventual consolidation of these small town school systems to a county system, there has been a predictable evolution of a comprehensive school system for Cocke County. Today, the Cocke County School System has approximately 4,500 students enrolled in the following schools.

Bridgeport Elementary School (K-8)–210 students
Centerview Elementary School (K-8)–346 students
Cosby School (K-12)–869 students
Cocke County High School (9-12)–1159 students
Del Rio Elementary School (K-8)–168 students
Edgemont Elementary School (K-8)–578
Grassy Fork Elementary School (K-8)–83 students
Northwest Elementary School (K-8) 394 students
Parrottsville Elementary School (K-8)–535 students
Smoky Mountain Elementary School (K-8)–187 students

In addition to these schools and under the administration of the superintendent, the Cocke County Adult Education Center offers special programs to meet the needs of the adult population. Among these programs are those listed below:

Adult High School: This program allows participants to earn a regular high school diploma by fulfilling attendance and course requirements.

GED Classes: The tests of General Educational Development (GED) offer people who did not finish high school the opportunity to earn an equivalency high school diploma.

Adult Education Basic Skills: Basic reading, writing, and math preparation for those adults needing to master/upgrade these essential skills.

Families First Class: Designed to enable Families First participants to master/upgrade basic reading and math skills.

In addition to the public schools as a part of the Cocke County School System, there is Newport Grammar School, serving students in grades K-8. This school is "owned" by the city of Newport and operated by the Newport Board of Education. Students living within the city limits of Newport are eligible to attend. For a tuition fee, students living in Cocke County outside the city limits of Newport may attend on a "space available" basis. This school is accredited by the Southern Association of Colleges and Schools. Started in 1897, this school is one of the oldest continuing schools in the area, and it has an enrollment of more than 700 students.

The school system is governed by a 7-person board of education with members elected from defined geographic areas of the county. The administrator of the system is Mr. Larry Blazer, who holds an M.Ed. degree in Supervision and Administration from East Tennessee State University. He has 15 years of experience as a teacher or principal in Cocke County and12 years as superintendent of the Cocke County School System. Among other administrative or supervisory personnel at the system level are the County-Wide Instructional Supervisor, an Administrative Assistant, and an Attendance Supervisor. Each building/school is headed by a principal who is appointed by the board on the recommendation of the superintendent.

The Cocke County schools' 1998-99 *Report Card* provided the basic characteristics about the system. The school system had about 4,638 students, of which 96.4 percent were white, 2.1 percent black, 0.3 percent Asian, 1 percent Hispanic, and 0.3 percent American Indian. The overall attendance rate that year was 94.8 percent. The percent of students who dropped out was 3.7 percent, while the percentage of the entering 9th grade students who had dropped out by the end of the 1998-99 school year was 14.5 percent. According to Superintendent Blazer, this compares with the dropout rate of 22.6 percent for the previous year. We were told that the dropout rate has been improving, but this was not borne out by the data we reviewed. Many students do not go to college because of lack of resources to do so. It was also reported that high-achieving students avail themselves of scholarship opportunities. It was said that the counselors do a good job of informing the students of these opportunities and helping them to make strong applications.

Included in the county school system are the comprehensive high school located in Newport, eight K-8 schools scattered throughout the county, and one outlying K-12 school in the town of Cosby. The latter school is an anomaly; apparently political clout in the school's attendance area has kept the higher grades in that school. Another unusual feature is that Newport city has maintained a separate K-8 school system. It is said that the affluent kids go to the Newport K-8 school (Newport Grammar School) and that the poorer kids go to the K-8 schools of the county. However, the current location of the Newport Grammar School is in the neighborhood of the few poor minorities who reside in Newport. All students in the county go to Cocke County High School, which has an enrollment of a little more than 1,100 students. The November 1999 Cocke County *Report Card* noted that 38 percent of the elementary schools and 50 percent of the secondary schools are accredited by the Southern Association of Colleges and Schools (SACS). As of December 1999, all elementary and secondary schools were accredited by SACS.

We found the school facilities to be clean, orderly and, for the most part, shiny. There was a feeling of safety and comfort in the buildings we visited. In 1998-99, only 0.3 percent of the students were expelled and 7.9 percent suspended. All of the buildings are or soon will be undergoing renovation and/or expansion.

In 1998-99, salary levels of teachers averaged $30,524 (up from $23,767 in 1991-92), compared with the state average of $35,490 (up from $28,621 in 1991-92). The average per pupil expenditure across the system in 1998-99 was $3,929, with 78 percent applied to classroom instruction. In 1998-99, the system derived 25 percent of its funds from the locality, 60.3 percent from the state, and 14.7 percent from federal sources.

Many teachers grew up in the area or married someone from the area and very much like living in this beautiful geographic setting. Thus, a large number of teachers spend many years in this system. Consequently, most of the teachers and administrators were educated and received their certification through one of the colleges/universities in the region. They are fortunate to have a variety of institutions, i.e., the state university, a regional state university that has a long history in teacher education, a small private institution, etc., from which to pursue initial and continuing professional development.

The Title I representative expressed frustration. He said that the K-8 city school tends to want to send its low-achieving, special education, Title I students to the county system and to retain those who could gain. He said this contributes to putting county schools in the at-risk or "needs improvement" category. It was noted that county children pay tuition to go to the city K-8 school. This creates a kind of talent drain, which discussants said makes it difficult for the system to look good on achievement results.

It was noted that the county will have only one school in the "school improvement" category: Northwest K-8 Elementary School. The principal of that school, which is in the city of Newport, is Mr. Skip Gregory. He is an impressive, candid educator. He's been in the system for many years and has a very thoughtful perspective on it. He is soon to retire. It is noteworthy that his

wife, a teacher in the system, also will retire soon. Walking through the school one notes that this one, more than the others observed, is in need of repair. It has an old, stained carpet throughout much of the school. Originally, this school was built in the open school concept. The building is about 25 years old. A computer laboratory, a handicapped room, and a special education center were visited. The principal said that about 98 percent of the students in the school are on free or reduced meals. (Across the district, 67.9 percent of the students were on free/reduced price meals during 1998-99.) This school apparently receives the students that no other school wants, especially the separate city K-8 school system. In that respect, the principal agreed that Northwest receives "push-outs" from that school.

Regarding the issue of a separate city K-8 system inside the larger county system, Mr. Gregory said there has been some talk of consolidation. He said that there are transfers of students from one system to the other. Apparently, the money is not an issue, as the money via state allocations follows where the students go. It was interesting to hear that the state's per pupil allocation to systems is based on average daily attendance, which is based on some kind of an average across four attendance periods.

During the time of our site visit, there was an ongoing dialogue surrounding the decision to not reappoint the principal of the city's K-8 "grammar school." The local newspaper, The Newport Plain Talk, carried a front page article in the April 18, 2000, edition about the situation. It was reported that about 50 persons attended the school board meeting in support of the current principal, and there was an almost full-page letter to the editor in support of the current principal. It was interesting to note that recommendations for action in the letter to the editor asked interested parties to "Communicate your concerns to the mayor" and "Sign petitions which we understand are being circulated and which will be presented to the Board of Education, and the Board of Mayor and Aldermen, and the media." While there is no direct relationship between this situation and the county school system, there is a clear presence of the county system in the city of Newport, as this is the location of the administrative offices, the high school, and other school facilities; and it would be reasonable to think that a number of the residents do not understand the distinctions and separate jurisdictions of the two public school systems.

It is also interesting that there are no middle schools in this system. While some of the educators have pressed for a middle school, there is a turf issue. The residents associated with each elementary school elect a member of the school system board of education. Each school wants to keep its own school intact, its own board member, and its athletic teams. These desires would be in jeopardy if the system were to develop a large middle school and move all the grade six through grade eight students to that middle school. Interscholastic competition is clearly present among the several elementary (K-8) schools, and athletic trophies and team mascot images are proudly displayed. In essence, the school teams represent communities; and they, like any rural community, have traditionally taken great pride and ownership of the school athletic teams and other student groups.

The principal of the Cosby K-12 School, Mr. Burchette, conveyed a lot of information to us that is useful in understanding the Cocke County School System. The following bulleted points capture some of his main observations.

- Students can choose which of two high schools to attend. He cited many reasons for students' choices, including convenience to their parents, who may work in the Gatlinburg area; personality conflicts with teachers; etc.

- His school is engaged in a new building program. They will be adding, among other facilities, biology and chemistry laboratories. Such building programs are going on throughout the system.

- The high school offers two years of chemistry and physics. He said, "We need to offer some courses every other year because we only have two and a half science teachers for the whole high school."

- When teachers have money left over in their purchasing accounts, they have been agreeing to have that money pooled so that the school can buy microscopes.

- He told us a school board member represents the Cosby School and the Smoky Mountain area. Later, he noted that the new school board member had persuaded the rest of the school board not to renew this principal's contract. Subsequently, we found out that the new school board member is married to the guidance counselor in this school and heard that the reason for the principal not being retained may be political.

- Students in the Cosby School can go to Cocke County High School to have special needs met, such as vocational and special education.

- The graduating class at Cosby will be about 68 this year. Normally, it is about 80.

- The principal saw the compulsory attendance until age 18 as a problem. He said that many parents kick the kids out of the house on their 18th birthday. When these kids are still enrolled in the high school, they often have no place to live.

- There is no age cutoff for attending the school, so students who don't graduate by age 18 or 19 can actually stay to complete their diploma.

- We observed that this administrator and many others have spouses working in the school system.

- About 40 to 50 percent of the Cosby graduates go on to some form of higher education. Many go to Walters State Community College, which was considered a valuable educational resource for the area. Many get financial support. However, those receiving

financial support often have to drop out after the first year because low grades don't justify continued scholarship monies. Without the scholarship funds, the students can't afford to continue.

- Many, if not most, of the students are closely tied to the community. They can't stand or even countenance the prospect of cutting the cord from the community. This, of course, limits their future employment options.

- Walters State Community College was said to be about 25-30 minutes from Cosby High School and again was stressed as a major resource for the area.

- About four or five Cosby students per year enter a 4-year college.

- No more than 10 percent enter the military. The principal noted that this percentage has been declining. He saw this decline as unfortunate, since he thinks kids from the area need to see what's outside the community area.

- Graduation costs are seen to be getting beyond the reach of the students. Because of peer pressure, they try to pay for caps and gowns, graduation rings, etc., and simply can't afford the expense.

- The school is able to provide few trips to places like Atlanta for the students, which the principal sees as regrettable.

- The principal mentioned that there has been a great influx of people from outside the area, for example, New Jersey and Florida. He said these people are bringing little more than demands. They want what they had where they came from. On the other hand, many of them are not gainfully employed, go on the welfare rolls, and are a real burden on the school system. He said that academically many of the incoming students actually are behind the Cosby students. He said, "We get them because of our health care program and special education." Tennessee's insurance program, called TennCare, provides health care for those who can't afford it. He said there is no waiting period to receive the money and that the influx of these nonproductive persons is hurting the school and the area.

- The principal then stressed that for the most part there are only low level employment opportunities in the area.

- He said that high tip rates in Gatlinburg entice high ability kids to skip college and take the readily available earnings they can get on a seasonal basis in the resort areas.

- He said that science does turn the kids on because of its hands-on orientation.

- The principal noted that during our visit the students were having what the school terms "A Terrific Kid Day." He said that kids are invited to set their own objectives for achievement. When certain kids do achieve the objectives they themselves have set, they are recognized in a "Terrific Kids Day" ceremony, which reinforces their setting and achieving of personal goals.

- The principal gave us quite a few examples of how area businesspeople and residents provide good support to the school. He said when there's a need, the community, the churches, etc., rally together and are able to dig up resources to meet the needs.

- The principal talked with great pride about the school's basketball prowess. It is one of the state powers, having won second place in the state tournament for the last two years, and in the past participated frequently in the state tournament.

- In response to a question, Mr. Burchette said that churches' influences have not been a problem for the school. He said, "In this school we stay away from Darwinism. We teach evolution in the context of how plants develop and what results from cross-breeding of animals." He said, "We do offer some sex education." In that respect, he noted that this is a Southern Baptist belt.

- Teen pregnancy was identified as very high. When asked about whether the churches help to combat this issue, Mr. Burchette said, "Not really." He said the people who attend the churches, including the children, are not the source of the problem. He said the students who go to church basically aren't the ones who are getting into the problem of teen pregnancy. He said among those girls who do get into the problem, having a baby is a status symbol for them. There are no community or social deterrents to teen pregnancies, such as used to be the case. The principal stated that at least the school should separate out the pregnant girls, educate them in a separate area, and basically focus on teaching them child care and responsibility as opposed to continuing with their academic education.

- When asked why this K-12 school has survived, since there is a high school in Newport, the principal said that consolidation has been avoided because of a strong community and strong community support for retaining this school. He said that there are both advantages and disadvantages to running a K-12 school. He said putting young kids with older kids can be a problem because the young children pester the teenagers. But he said there are many advantages. For example, this school doesn't have "freshmanitis" since there isn't the stark experience of transferring an eighth grade student from one building to another. He also said that disciplinary problems tend to be lower, he thinks, in a K-12 school. He said that the disciplinary problems his school experiences are basically from people transferring in from outside the area.

- The principal said that "math is still our number one problem."

- He noted that his school has identified a group of sixth grade students who have special promise. These students are being put in a transition class and readied for accelerated math.

The principal then took us on a tour of his building, introduced us to some teachers, and showed us the construction under way. We found Mr. Burchette to be a highly impressive educator who knows what is going on in his school. He is very thoughtful in analyzing the school's needs and problems and in assessing what is being done to address those problems. He seems greatly in command of all that this school does. It seems unfortunate that this school community will lose his probably very effective leadership.

From data compiled by the Tennessee Department of Education, the following information is pertinent to understanding the assets and some of the challenges the Cocke County School System faces for the future.

Personnel (1998-99)

(Percent of Total)	System	State
Administrators	3.8%	3.5%
Teachers	48.7%	51.2%
Student Support	5.2%	5.3%
Assistants	11.1%	11.2%
Staff Support	4.7%	5.1%
Other	26.2%	23.5%

Year 2001-2003 Class Size Standards

Schools Meeting Standard	53.8%	62.3%
Classes Meeting Standard	97.9%	98.5%
Classes Over Size	14	2,031

Student Demographics

Racial Background (Total Students):		
% White	96.4%	73.6%
% Black	2.1%	23.9%
% Asian	0.3%	1.1%
% Hispanic	1.0%	1.2%
% American Indian	0.3%	0.1%
English Language Learners	25	9,191
Special Education	804	145,289
Free/Reduced Price Meals	3,149	366,319
Title I Eligible	39.8%	25.1%

Nonacademic Data

Attendance Rate:		
% K-6	94.0%	94.8%
% 7-12	92.7%	92.6%
Promotion Rate (K-8)	97.1%	96.4%
Dropout Rate:		
Event Rate-% Total	3.7%	4.2%
Cohort Rate-% Total	14.5%	14.8%
Male	15.2%	16.7%
Female	13.8%	12.7%

Selected Academic Student Performance

Mathematics-National Percentiles:		
Grade 3	55	58
Grade 4	56	57
Grade 5	45	56
Grade 6	50	52
Grade 7	62	54
Grade 8	53	54
Science-National Percentiles:		
Grade 3	47	50
Grade 4	50	50
Grade 5	45	51
Grade 6	49	55
Grade 7	49	53
Grade 8	54	56
Exit Exams-ACT (1-36):		
Mathematics	19.3	19.8
Science Reasoning	19.1	19.8
Exit Exams-SAT:		
Verbal (200-800)	580	559
Math (200-800)	610	553
Combined (400-1600)	1,190	1,112

Based on information provided to students as they register for the Cosby and Cocke County High Schools, the following course offerings are available in the areas of math and science.

Math

- Algebra I and II
- Competency Math
- Basic Math (I.P.E.) I, II, III, and IV
- Geometry
- Foundations I
- Foundations II
- Pre-Calculus
- Trigonometry

Science

Life Science:

- Agriscience
- Biology I and II
- Life Science
- Marine Biology

Physical Science:

- Astronomy
- Chemistry I and II
- Earth Science
- Geology
- Physical Science
- Physics–Principles of Technology

In the Cocke County School System, a student has an option of two paths (Technical or University), both of which lead to graduation. In the Technical Path, a total of 28 credits is required with a minimum of 3 units in math, including completion of Algebra I or Math Tech II and 3 units in science to include one life and one physical science. In the University Path, 28 credits are required with a minimum of 3 in math (Algebra I and II and Geometry) and 3 units in science (one life and one physical science).

From the Philosophy and Goals section of the Student Handbook for Cocke County High School, several key statements have been extracted and listed below.

. . . our primary purposes are to offer them (students) a productive and satisfying high school experience and to prepare them for responsible and effective participation as citizens of an increasingly complex world.

. . . expectations and standards call for a flexible, diversified curriculum which is relevant to the needs of the students as well as the demands of society.

. . . highest aim is that our students will have become clear-thinking, creative, responsible citizens with the intellectual and social skills needed to pursue any career of their choice in keeping with their abilities and opportunities.

We want our students

to develop attitudes, skills, and knowledge essential to learning; to enlarge their store of knowledge;
to develop respect for learning as a life-long pursuit; to explore uses for the facts which they acquire;
to sharpen their ability to read and listen closely and critically and to write and speak clearly and forcefully;
to use current technologies where appropriate; to maintain a community of trust, respect, and dignity;
to develop a healthy respect for themselves and a tolerance for the perspective of others, and
to develop an informed respect for good health and a commitment to life-long well-being.

Involvement with the Appalachian Rural Systemic Initiative (ARSI)

Cocke County School District is one of 44 counties in 6 states that participate as a part of the Appalachian Rural Systemic Initiative (ARSI). ARSI's three strategic goals are listed below:

1. Strengthen the knowledge and skills of teachers in Grades K-12 so they can teach mathematics and science more effectively.

2. Establish a timely and coordinated system for helping schools enhance their capacity to deliver active, standards-based teaching and learning environments on a long-term basis.

3. Build regional partnerships, local leadership, and local community involvement and support for long-term educational improvements.

Descriptive information about ARSI states:

> . . . ARSI builds on local efforts and coordinates people and resources to the fullest advantage of the students. Keeping local educators in the driver's seat, ARSI adds value to reform efforts through its **Resource Collaboratives**, **Community Engagement**, and **Resource Awareness** activities as well as on-going partnerships with local and national mathematics and science initiatives.

The Resource Collaboratives, located at five partner institutions (Clinch Valley College at the University of Virginia, Marshall University, Ohio University, University of Kentucky, and the University of Tennessee), are described as the "foundation of ARSI." Collaboratives partner with the teachers, schools, and communities that drive the effort to enhance mathematics and science

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instruction and improve access to resources. As a part of this effort and with support from ARSI for part-time release from other duties, a Teacher Partner is designated in the Cocke County School System (and other participating school districts) to

- acquire more in-depth knowledge about mathematics and science
- plan and implement research-based instructional practices in their classrooms
- provide hands-on learning opportunities for their students
- serve as mentors with other teachers in their school and district
- provide valuable resources for their colleagues

Other forms of assistance and support through ARSI's Resource Collaborative include use of national and local mathematics and science experts to provide Teacher Partners with localized professional development opportunities; almost unlimited access to standards-based curriculum activities and educational materials through World Wide Web sites; help for Teacher Partners to develop classroom lessons for their unique circumstances; and specific strategies for adopting instructional materials, aligning curricula, and analyzing students' needs based on mathematics and science assessment results. It is said that "Teacher Partners, in turn, broaden ARSI's impact by sharing lessons learned through hands-on experiential opportunities with other teachers in their district."

According to ARSI descriptive materials, its (ARSI's) "value to the region lies in the solid commitment to addressing issues at every level, from the student to the state. This perspective enables ARSI to develop system-wide improvements and, with the aid of its five Resource Collaboratives, produce long-term, sustainable improvement in mathematics and science instruction and learning." This takes the form of coordinating mathematics and science program improvement reviews; helping districts develop educational improvement plans that identify strengths and weaknesses in each school along with recommendations for improvement; and providing opportunities for communities throughout the region to exchange innovative ideas and network among peers, as well as assistance to develop local school level web sites.

In its efforts to partner with communities, ARSI reports that it provides Community Engagement Teams with the tools and knowledge to investigate the status of mathematics and science education in their schools.

According to ARSI officials, four aspects of its approach to systemic reform in the region are most important:

- provision of localized assistance
- ability to draw on the strengths of higher education

- encouragement of higher education to "get into the schools of the region"
- use of nonthreatening interventions

In each district, catalyst schools are established to be model schools. While there do not appear to be any "hard and fast" criteria for catalyst school designation, there must be a supportive principal, a Teacher Partner selected, and arrangements made for the Teacher Partner to focus on improvements in that school. The role and specific responsibilities of the Teacher Partner are mutually determined by the Resource Collaborative director or representative for the region and the collective group of Teacher Partners in the Cocke County School System. Important considerations in selecting the Teacher Partner are candidates' reputations in the district, ability and willingness to work at the level(s) of the catalyst schools, and commitment to the goals and objectives of systemic reform exemplified in this project as compatible with local district needs.

Ms. Biddle is the designated ARSI Teacher Partner for the district, and she maintains a network of other building-level Teacher Partners among the systems' schools. Ms. Biddle provided the study team with a summary analysis of the time she engages in identified activities in the role of Teacher Partner (see Table 1).

Table 1

Summary of Teacher Partner's Time Devoted to Identified Activities

	Activity	Percentage of Time
A.	Help locate needed information or resources	48 %
B.	Observe classroom lessons	8 %
C.	Conduct demonstration lessons/team teaching	<1 %
D.	Work with teachers on instructional planning	<1 %
E.	Meet with administrators or other school personnel	8 %
F.	Meet with community member or other outside persons	12 %
G.	Make presentations to groups	4 %
H.	Lead workshop or professional development activity	<1 %
I.	Participate in committee work	<1 %
J.	Build personal knowledge and skills as Teacher Partner	16 %
K.	Other	4 %

Reasons for Attempting to Reform Science and Math

It was said that involvement with ARSI was pursued because scores in math always have been low. Also, the ARSI opportunity fit in with the need to implement a standards-based curriculum and the system's 5-year school system improvement plan.

In lamenting the state of his system, the superintendent said, "We've been behind so long. We are taking steps that a lot of systems took many, many years ago." He said one of the system's big problems is turnover of teachers, especially in the area of math. He attributed this to a low pay scale that lags behind that of many other systems.

Turning to his reaction to ARSI, he said, "It's a big help. We would like to keep it forever." He said, "We especially need it in the area of math." He said, "Math is our weakest area. We think that we are making progress. We now are offering two advanced placement classes, English and calculus."

Integration With/Influence of Parallel Initiatives

Obviously, the ARSI activities are integrated with the system's 5-year school improvement plan, its attempts to meet state standards and implement its own standards-based curriculum, and its efforts to address the state's pressures for accountability and improved test scores. The program also meshes with the system's Title I efforts to raise math and reading performance.

Plans and Evidence of Success

Most respondents were very positive about their involvement with the ARSI activities and viewed them as successful. ARSI pays for approximately half of a teacher's salary to serve as the system's teacher partner. ARSI also pays for attendance at monthly meetings, with the county school system supplementing required travel funds as necessary. ARSI brings excellent professional development opportunities to teachers and others in the system. Staff members cited the ARSI-associated curriculum audits as helpful. It was said that ARSI gives them a lot of information. Specifically, the ARSI web site was mentioned as a very useful and used resource. It was also observed that the process for helping teachers get state funds has been assisted by ARSI. Apparently, one of the ARSI workshops helped principals get a better handle on how to assess science and math teaching. The principal from Cosby said that the workshop participants have brought back tubs of useful materials to teachers and that the half-time involvement of Missy Biddle has been tremendously helpful to the teachers.

Another principal said that many teachers don't know about the ARSI opportunities, and he thought the effort could be strengthened by making teachers better informed about ARSI. A specific example of assistance from the local RSI was that Peggy Hammonds helped to judge a science fair at the K-12 school. In general, it could be said that the respondents saw the ARSI

project as a very useful resource for teachers and one that is sufficiently flexible and responsive to address particular needs.

Mr. Blazer, the superintendent, reported that the system's teacher partner is doing a very good job and that he will try to hire her for the teacher partner function even if NSF funding isn't there. He expanded by saying he might even hire her full time for that position rather than the half time she is doing now. He explained that soon the system will be employing the new Gateway Tests in particular subject matter areas. He mentioned this in the context of telling us that the "middle school" teachers are not subject-certified. He said that the system is weak across the board and needs to improve. When asked about his stress on technology, he said he would like to see everybody in the system on the Internet, that he is promoting and trying to support training in and integration of technology into the curriculum. His general question, so far, concerns whether the teachers are actually using the technology that he's been trying to provide to them. He said some steps are under way to find the answer to that question.

Ms. Stokely's first grade class in the Northwest School was visited by the evaluation team while she taught a math lesson. The first and major part of the class period was devoted to the use of manipulatives (yellow and red cubes and multicolored, nutritionally correct jellybeans) to teach addition. The students were basically quiet, involved, and compliant. Most of them correctly answered the teacher's questions. The class was concluded with workbook exercises in which the teacher read the questions, the students filled in the blanks, and then the teacher queried the students on their answers. At the end of the class session, Ms. Stokely took the time to work with those students who had difficulty with the workbook exercises and to try to ensure that they got the correct answers. This session was then concluded with the students leaving for lunch.

Ms. Stokely expressed satisfaction in using the manipulatives approach. She didn't seem to know too much about ARSI and was not aware that her school had a teacher partner. Regina Gregg is the teacher partner at that school.

When the evaluation team visited the Bridgeport K-8 School, a teacher partner, a seventh grade teacher, and the school principal were interviewed. The teacher partner, Mr. Suggs, was very positive about the beneficial aspects of ARSI. He spoke of useful workshops, useful materials that he could bring to the teachers in his school, and participation by a number of teachers in the ARSI-sponsored workshops. The seventh grade teacher was friendly, but quite occupied with her students, so we didn't get much substantive feedback from her. The principal told us that, as a part of the building renovation program going on across the system, his school will get a new wing. He intends for that wing to become essentially the middle school wing of his school, with the older facility occupying grades 1 through 5.

Following the visit to the Bridgeport School, the evaluation team attended a meeting back at the system office of the teacher partners. This included the head or system teacher partner, Ms. Biddle, and each teacher partner from the different system schools. First there was a business meeting of the partners, which we observed. Included on the agenda was a presentation on new

opportunities from ARSI and other sources, an invitation to be extended to interested teachers to work on the further development of curricular standards, and an update on web sites, especially regarding career information. There was also discussion of progress toward getting all of the teacher partners networked on the Internet. Ms. Biddle distributed workshop announcements and schedules so that the teacher partners could take them back to their constituent teachers. Newly available kits were identified. There was a reference to a list of resources to be placed in the system's newsletter. Also, a particular professional development institute was described, along with the costs associated with attendance.

Following this business meeting, we were invited to interact with the teacher partners. It should be acknowledged that, consistent with all of our visits to RSI sites, we were accorded hospitality far beyond what we should have expected. Ms. Biddle paid for our lunch that day. At the teacher partners' meeting, cheesecake, cookies, chocolates, and soft drinks were served.

During the meeting with the teacher partners, Dr. Horn gave an overview of The Evaluation Center's project to evaluate the Rural Systemic Initiative programs and asked for feedback on how ARSI has been working in the county system.

The first respondent said that he and the others had gotten materials at the ARSI office and from ARSI workshops. He said not only that, but while at the workshops, "We were taught how to use the materials. We then came back and made them available to teachers and students in our schools." He said many of the materials were very simple materials, but also very helpful.

The second respondent said, "Now we know what is going on. ARSI has helped tremendously to improve communication among teachers and other personnel in the system." When asked how this communication was being improved, the answer was through meetings like the present one. With some prompting, they also said that yes, the system's newsletter by Betty Jones and also the ARSI newsletter from the University of Tennessee had helped with the communication issue.

The third respondent (Betty Jones, the system's librarian and resource center leader) said that she is sending out a lot of science materials to the schools. She said she sends more of those than any other content area materials. She said, "I'm a librarian. I buy what the teachers request and use, and they've been requesting and using science materials."

Mr. Joe Burchette, principal of the Cosby K-12 School, cited an example related to science education in his school. He noted an Ohio State University-based project wherein a female graduate student will traverse the Appalachian Trail (about 2,000 miles) while documenting the experience and using it to develop curricular materials keyed to the science-education-relevant experiences in traversing this trail. A fourth grade class in this school will monitor a web site to keep up to date on the woman's progress across the trail. The students will use the experience to help develop a science education unit. The principal cited this as one example of how his school is very much interested in improving its science education program.

When asked how his school is different than it would have been without the ARSI program and what he sees as the impacts of ARSI on his school, the principal of the Cosby School at first seemed startled. He said, "That's an awfully good question." After he thought for a while, he listed the following perceived contributions of ARSI:

A. Web sites. Every school has a computer and access to the web sites.
B. Teachers are being trained to use computers.
C. We have an ARSI handbook on math. I hope we'll get one in the area of science.
D. Missy Biddle's visits are valuable to our teaching staff.
E. We're given ideas that help us to be more creative in our teaching and our design of teaching units.
F. The ARSI principal's handbook gives ideas on how to evaluate science and math teachers.
G. The state teacher evaluation system is complicated and paper intensive, but overall the testing program is helping us to think about and to improve our programs and teaching.
H. The ARSI book on state curricular standards has been useful.
I. ARSI has brought a new awareness to our teachers regarding manipulatives and approaches to mathematics and science instruction.

Limitations

When asked to identify impediments to the successful use of ARSI, a variety of respondents presented the following items:

1. Elementary teachers need more time to plan and prepare. When asked how this need could be met, one of the respondents suggested that the system should mandate a planning period for teachers. Another respondent said, "We had ten in-service days, and now we have only five. We've lost much of the professional development that we used to have." Another participant then said, "You gotta remember that the teachers negotiated the professional development days away." (However, the team learned that the state department of education actually designated five of the days as student days.)

2. We have insufficient subject-matter certified persons in grades 7-8. (In this instance, it was noted that in cases where there are certified teachers, the principal tries to assign them across grades so that there is competent instruction provided in the subject matter area across the grades.)

3. There is a need for increased and improved science laboratories.

4. It was emphasized that there is a national problem in that teachers are not being well trained to teach mathematics and science at the elementary school level.

5. Money to pay competitive salaries to teachers is a chronic and continuing problem.
6. The lack of jobs in the geographic area tends to present low incentives for students.

7. There was a heated discussion about "teaching to the test." At one of our meetings, teachers and principals both said essentially that school staff are operating within the bounds of propriety, but teaching to the tests. One teacher said, "If it's not on the test, I won't teach it." Paraphrased, a principal said that because of the accountability pressure, if it's not on the test, he has to counsel teachers not to teach it and instead to concentrate their time on what they know will be on the test.

8. Testing is clearly a frustrating area for teachers and principals. One respondent said that the science test is mainly reading comprehension. It was also mentioned that some kids take tests seriously, and some don't. Based on conversations with lead personnel in the program and one school principal, there is tremendous confusion and misunderstanding of the testing information. The gamesmanship associated with looking good on accountability reports and avoiding sanctions may largely outstrip the educational value of the apparently enormous amount of testing in process.

9. The amount of time devoted to testing was a particular issue. It was noted that students get tired by the end of the testing week. Discussants said it should be kept in mind that the students probably don't take the last test in the week seriously; we gathered that this test was social studies. It was also mentioned that during the 4 days of testing, students have very long testing periods, some of the periods being 80 minutes. It was noted that that is a long time for a second grade student to be involved in the testing. (It seems ironic that the superintendent and many other teachers are reported to have indicated that they would like to see testing done at the first grade level, if not the kindergarten level.)

10. There is almost unanimous resistance throughout the system to the notion of judging teachers based on the test scores of their students. Most of the system personnel we interviewed neither understood nor trusted the value-added testing system being used throughout Tennessee. A variety of school system staff emphasized that it's not fair to evaluate teachers based on student test scores. It was considered that there are simply too many factors that go into a student's test performance and that the testing period takes place in a concentrated period during only one small segment of the long school year.

11. The superintendent said he is not totally for the testing and stated that fairness in testing is an issue. He said the teachers who are held accountable for the test scores of their students argue that some who teach in areas not tested aren't being held accountable for student test scores and thus are not judged on the same standard.

12. Lack of parental involvement was identified as a significant impediment.

13. One respondent said, "Parents may have low aspirations for their children's education and many parents are single parents; at night they are both tired and don't have the knowledge and skills to help their children with homework."

14. It was also said that parents are more interested in sports than academics and, in general, that the demands on parents are very great.

15. Distance and remoteness were cited as reasons for inadequate use of resources in this general area of Tennessee. It was noted further that many of the students haven't been outside the county.

When asked to cite facilitating factors, respondents identified the following:

1. Student interest has increased.
2. Student test scores have improved.
3. Teacher collaboration is better.
4. The school system's street festival has been a positive thing for the community and the school.
5. The superintendent said testing has some positive effects, apart from the problems with testing he also acknowledges. In an interview, regarding the testing issue, the superintendent said that "We hear a lot of complaints." "But," he said, "anything that will cause you to look at yourself can't be all bad. Looking at oneself, diagnosing, asking how we can do better helps to stimulate improvement. The improvement process is good. It's causing us to think 'lesson planning.' Testing has created improved communication. Because of that communication, we've created opportunities for better and more use of technology and needed in-service education."

The principal of the Cosby K-12 School also saw positive aspects of the testing program. He said test scores have been improving and that the Terra Nova test results are useful. "They identify objectives and help us to flag kids who need special attention. We're getting much more information that the teacher can use." He said his school conducts work sessions to help the teachers go over test results and plan for future instruction. It is noteworthy that the teachers in these work sessions look at the student achievement test results for the grade prior to the one in which the teacher teaches, the grade at which the teacher teaches, and the grade following the grade in which the teacher teaches.

Progress and/or Presence of the Drivers of Educational System Reform

Evidence of the presence or progress toward fulfilling the intent of the Six Drivers for Educational System Reform, as disseminated by the National Science Foundation, was a major focal point of the visitation team's work. In the following section, these findings are summarized.

Driver #1: Implementation of comprehensive, standards-based curricula as represented in instructional practice, including student assessment, in every classroom, laboratory, and other learning experience provided through the system and its partners.

The accomplishment of Driver 1 is evidenced through several indicators for which extensive data exist. These include having a high quality curriculum that is aligned with national standards; having a standards-based curriculum implemented in classrooms; having teachers who report the use of recognized standards; and having assessments aligned with standards and curriculum. Modest evidence exists that other indicators of Driver 1 are being accomplished: a high quality curriculum is implemented with all students; hands-on, inquiry-based instruction is occurring in classrooms; teachers are able to articulate instructional standards; curriculum/instruction is relevant to the locale of the student; students have opportunities to learn about careers and educational requirements in science and mathematics; and activities are changed to improve curriculum.

The greatest difficulty in assessing the accomplishment of Driver 1 is the testing program that is in place or that is being put into place. Tennessee has adopted an "accountability model" in which teachers are held accountable for the achievement progress of their students. This model is used for all students in grades 3 through 8 as well as 10 (ultimately) courses in the high school. The testing for the elementary students requires 4 days to complete.

The teachers believe that the tests are related to the standards that Tennessee has adopted into its framework but that there is not an even distribution on the exams. As a result, the teachers are examining the curriculum for topics that are included on the versions of the exam they are using and teaching those areas prior to the exam. Any topics that are the teachers' special or favorite things to teach are being delayed until after the exams. The teachers are doing this with the full knowledge of the principals. All persons involved are very concerned that the exams are driving the curriculum. For the most part, this is seen as negative, but some teachers and principals disagree.

Aside from the issues discussed above, extensive curriculum and instructional planning documents have been developed for grades K-2, 3-5, and 6-8. Student learning expectations are matched with the applicable Tennessee Framework and the objectives and subskills in the Terra Nova standardized test. If implemented to their fullest extent, these guides provide a clear road map for teachers and a content/skill development accountability measure for teacher performance. It is not clear that similar documents are in development or completed for grades 9-12.

The various stakeholders agree that the staff development needs should arise from the teacher needs. They see ARSI as being responsive to these needs. The various stakeholders seem to be in agreement that ARSI has dramatically increased the amount of in-service available.

Two schools have undergone curriculum audits (Cocke County High School mathematics and Northwest Elementary School) to ensure alignment between the curriculum and the state standards. No plans were discussed for more schools to do this. The audit was performed by ARSI-related personnel for the first school, and then a teacher from that school performed the second audit.

The ARSI web site is a good tool for making teachers aware of workshops and other professional development opportunities. In addition, there are lesson plans available that can be downloaded to help with the teaching of standards-related science and mathematics lessons.

When teachers and administrators were asked what the major impediments to the reform of mathematics and science teaching were, there were a wide variety of answers. These answers changed as the evaluator moved from school to school and as the persons who were asked changed from teachers to administrators. A group of elementary teachers reported that the lack of planning time was the major impediment; they suggested that planning time in common would be extremely helpful. Administrators at both the building level and in the central office suggested that the lack of subject-certified teachers was the major issue. There was a strong feeling that there just were not science- and mathematics-prepared teachers in the elementary schools of Cocke County, and those people were not available to be hired when a vacancy occurred in the schools. This issue is closely tied to the fact that many teachers in the K-8 schools of Cocke County are not comfortable with teaching science and thus it is reported that they tend to teach it after the other subjects are completed. Several teachers and administrators also discussed the fact that in the K-8 schools of Cocke County there were very limited facilities to teach science. Some schools are currently involved in building projects, which will eliminate this problem, but not all schools. Some principals reported that this was just not an issue.

When asked about the level of understanding of the standards, whether local, state, or national, there seemed to be a consistent response that approximately 50 percent of teachers in the local schools understood the standards and the standards movement.

Driver #2: Development of a coherent, consistent set of policies that supports: provision of high-quality mathematics and science education for each student; excellent preparation, continuing education, and support for each mathematics and science teacher (including all elementary teachers); and administrative support for all persons who work to dramatically improve achievement among all students served by the system.

In reviewing the material in this section, it may be useful to consider that policies can be viewed as canons and practices that are regularly understood, accepted, and practiced whether or not they are written and officially ratified. People interviewed seemed to view policy not as something written, but something that the system does or stresses. In the context of both specified and practiced policies, the Cocke County School System definitely has policies that are followed throughout the system.

The accomplishment of Driver 2 is evidenced through several indicators for which extensive evidence exists. Professional development is provided to train teachers to implement high quality curriculum; teachers and staff participate in professional development programs; policies require that all students be enrolled in high quality and rigorous programs; policies require tight alignment among curriculum, instructors, assessment, and professional development; policies support the system's capacity to collect and use data for continuous program improvement; professional

development requirements have changed; professional development focuses on program and student needs; qualified teachers are encouraged to remain in small, rural schools; and qualifications and assignments support personnel in the curriculum area.

Regarding graduation requirements, students must complete three math and three science courses. They can participate in Pathway (vocational) or academic tracks. There are two diplomas: one in special education, the other in regular education. The regular diploma is issued without notation concerning whether the student took the vocational or the academic track. Placement tests are developed locally and used to place students in appropriate courses. All students must take an end-of-course competency test at the end of their freshman year and may take such course competency tests at the end of grades 10, 11, and 12. Each year students are given up to three chances to pass the end-of-course competency tests.

Soon, the existing tests apparently will be replaced with the Gateway Biology, English II, and Algebra 1 tests. A passing score on these will be required for graduation. Other tests involved in the system include value-added, ACT, SAT, and the vocational Work Keys Tests. Students are given clear instruction and materials in the eighth grade as to the checkpoints for getting through their high school education. These materials denote what tests must be taken, when, and which ones have to be passed to graduate.

Modest paper evidence exists that other indicators of Driver 2 are being accomplished. These indicators include (1) policies indicate a coherent vision that encompasses all students; (2) policies strengthen the emphasis on math, science, and technology; (3) teachers implementing inquiry-based learning receive planning time, mentor teacher assistance, and opportunity for continuing professional development; (4) teachers are trained in the use of assessment; and (5) teachers are selected and retained on the basis of qualifications and value added to student learning.

ARSI clearly makes a wide range of resources and opportunities available to the teachers of Cocke County. This is probably the greatest impact of the project. Teachers are clearly aware that there are a great many professional development and in-service activities available through ARSI. A major factor in this is the system of resource teachers that ARSI has created. Each school system receives (from ARSI) financial support in the amount of $10-15 thousand to pay approximately half of this resource teacher's salary.

In Cocke County, the resource teacher has set up a network of partner teachers who meet on a regular basis. Most importantly, these partner teachers serve as the conduit for the dissemination of ARSI materials through the resource teacher to the teachers in the schools.

There is less participation in professional development by principals and other school administrators than has been observed at other ARSI school systems. For instance, other system principals have participated in science-specific workshops, which seemed to have a large eye-opening benefit for their understanding of curriculum reform. There is no evidence that has happened here.

The greatest policy impact occurring in the Cocke County schools is related to the statewide assessment that is being put in place. Teachers and administrators are greatly concerned about the impact of the statewide assessment on their careers and their schools. The schools are being held accountable for the gains on their scores by students. As a result, the curriculum is being modified across the grades to emphasize those things which are on the exam and to deemphasize those things which are not. This act overshadows any curriculum reform or desire to teach inquiry that is happening.

In the near future, there will be 10 high school courses that will have end-of-course tests that will influence final grades. Among these, algebra and biology will be two that are assessed. The local board of education is also instituting a system of "competency" exams for mathematics at the grade levels beginning with third grade. A second grade test will be given, but is not binding.

Driver #3: Convergence of the usage of all resources that are designed for or that reasonably could be used to support science and mathematics education–fiscal, intellectual, materials, curricular, and extra-curricular–into a focused and unitary program to constantly upgrade, renew, and improve the educational program in mathematics and science for all students.

While there is not a systematic plan to converge resources on science, math, and technology, there appears to be an informal understanding that math is a primary focus of the district followed by science and technology. Superintendent Blazer confirmed these areas as current priorities, and improvement is a long-term goal. As a result, the areas of science and math probably receive more than their proportional share of resources and administrative attention. Further, various title programs, i.e., I and VI, are used when possible to support professional development efforts within the district. While not necessarily a policy or declared long-term practice, leftover funds from other accounts have been used to make one-time purchases of specific science and math materials, including microscopes. In the educational media/resource center, the director explained that science and math were areas for which there were a lot of requests for materials; therefore, she tried to give priority status to these areas.

Within the operational procedures of the system, each school has a school improvement plan, and these plans direct and support resources for instruction. At this time, improvements in science and math are high priorities in these plans; therefore, these subject areas and associated professional development needs/requests are supported by resources from all available funding sources.

A large building program is in process, and this involves almost every school building in the county. In one way or another, i.e., by direct addition or improvement of laboratory/teaching space or by freeing up space, science and math instruction will benefit from this bond-supported effort.

General plans for technology, mainly represented by computers, include a laboratory that will accommodate 20-30 computers, a complete work station in the classrooms for each teacher, and 3-6 computers in science and math classrooms and possibly others. Also, many of the classrooms and most of the laboratories have access to the Internet. The results of this effort are clearly evident throughout the district. At Northwest Elementary School we were told of the school's participation in a state program whereby old, donated computers had been renovated by prison inmates and given to the schools. While this resulted in a hodge-podge of computers of different generations, it created a sense of accomplishment and pride in the effort and some obvious enthusiasm on the part of teachers and students.

Many classrooms are equipped with a receiver and hookup to Channel 1. Little use is now made of this resource, which has been available for 5-10 years.

Class sizes seem to be rather large, with 30 students per classroom at the secondary and upper elementary levels not being an unusual observation. Some classrooms have aides, and at least one student teacher was observed, but there does not appear to be an effort or plan to reduce class size and/or the student/teacher ratio.

Not many funds are available to support educational efforts beyond the regular school day and year. We observed one school with an after-school program that may extend to 6 or 6:30 p.m. for some students. This program, supported by an external grant, is clearly focused on educational outcomes and is not just a child care program.

Driver #4: Broad-based support from parents, policymakers, institutions of higher education, business and industry, foundations, and other segments of the community for the goals and collective value of the program, based on rich presentations of the ideas behind the program, the evidence gathered about its successes and its failures, and critical discussions of its efforts.

Most of the efforts for gaining support for what has been or is happening in this school system are related to the most immediate stakeholders, i.e., teachers, administrators, and to a lesser extent parents of students. The Community Engagement Team is actively involved in the reform effort, and it provides assistance and support in a number of ways. The team is composed of key personalities in the community who have clout and visibility. However, most of the parents of students in this school system are not directly involved in the reform planning or activation of the effort. Whether this is due to the relatively low educational level of many parents or whether this is consistent with similar activities in the county is not clear. The board members are elected by the citizens; and, as such, they have considerable influence in decision making that directly affects personnel and resource decisions.

Probably one of the most visible efforts of attempting to involve stakeholders is related to the work of the Community Engagement Team as it provides guidance and direction for the Teacher Partner and her work with the committee of school-based teacher partners. In discussions with

Mr. David Balch, an official with Newport Utilities, he confirmed his personal and continuing interest in the ARSI project and the overall efforts of the school system to improve math and science at the local level. He was cognizant of the planning and knowledgeable about what Peggy Hammonds (district resource teacher) and Missy Biddle (district teacher partner) were doing. At the same time, he had difficulty explaining how the students and the schools could pay back to the community.

There may be some question about the extent to which raising standards actually improves the education for all students. The efforts to inform students and parents of the requirements for graduation and the university track are critical links in defining student expectations. However, there is a concern that requiring high level math and science may actually force students to drop out of school and/or choose the vocational route, which has lower standards.

Driver #5: Accumulation of a broad and deep array of evidence that the program is enhancing student achievement, through a set of indices that might include achievement test scores, higher level courses passed, college admission rates, college majors, Advanced Placement Tests taken, portfolio assessment, and ratings from summer employers, and that demonstrate that students are generally achieving at a significantly higher level in science and mathematics.

Various reports and manuals were given to us to help us see the kinds of achievement trends in science and mathematics over the past several years. Generally, these provided indications of the extent to which recent scores have been better than previous scores and also contrasts with similar mean scores or mean gains at the state and national levels. The appended 1998-99 Cocke County School System's *Report Card* provides an overview of the kinds of student achievement information routinely available to system personnel and constituents. The broad array of information reflects Tennessee's longstanding, systematic, and comprehensive approach to student achievement evaluation that was largely pushed by the previous governor, Lamar Alexander.

However, while the testing program is comprehensive, carefully researched, and systematic, it is also confusing to many educators in Cocke County. In response to a request for information on the schools' testing program and testing results, a principal provided a document entitled *Using and Interpreting Tennessee's Value-Added Assessment System*, written by Sandra Horn and others. This manual seems to be technically defensible. However, it also appears to be almost unlearnable, especially by generalist educators. In response to questions about this manual and set of explanations, respondents said "We don't understand it," "We doubt if almost anybody in Tennessee understands it," or "I have never seen such a manual." The principal who loaned the manual to us said she must have it back, because it is the only one in the school. She may have been the only person in the school who had seen the manual.

Testing should be a positive, constructive part of the educational system in this county school system. It seems clear that the testing experience is at best a mixed experience for most of the participants.

Driver #6: Improvement in the achievement of all students, including those historically underserved.

Staff members reported that recently they have seen slight improvement in mathematics. However, the data in the Cocke County Schools *Report Card* (appended) gives a mixed picture on the system's progress in mathematics. Between 1997-98 and 1998-99, scores on the Comprehensive Assessment in mathematics improved their standings on national percentile scores at grade 4 (51 to 56), grade 7 (54 to 62), and grade 8 (53 to 54) and lowered their standings at grade 3 (56 to 55), grade 5 (56 to 45), and grade 6 (54 to 50). On the mathematics section of the Comprehensive Assessment Program Value Added Three Year Averages, the grades 4-8 students went down from 89.6 percent of the state norm in 1991-93 to 83.9 percent of the state norm in 1997-99. The percent of first-time freshmen passing the mathematics competency test was 65 percent in 1994-95 and increased to 71 percent in 1998-99, equal to the state average of 71 percent. The school system's average ACT scores in mathematics went from 18.0 in 1995-96 to 18.2 in 1998-99. The system's average SAT scores in mathematics went from 520 in 1995-96 to 610 in 1998-99. The system's applied mathematics Work Keys scores (3-7) went from 4.0 in 1992-93 to 3.7 in 1998-99. While there are instances of progress in mathematics test scores, there are instances of decline as well.

School personnel said that science scores have been getting better the last two or three years. They have seen more of an inquiry emphasis and more use of manipulatives among the teachers. The appended Cocke County Schools *Report Card* confirms that the overall picture of recent trends in science scores is slightly better than that for mathematics. However, the trends are still mixed. The Comprehensive Assessment scores in science modestly improved their standings on national percentile scores at grade 4 (45 to 50), grade 7 (47 to 49), and grade 8 (48 to 54) and lowered their standings at grade 3 (53 to 47), grade 5 (54 to 45), and grade 6 (51 to 49). In the science Comprehensive Assessment Program Value Added Three Year Averages, the scores for grades 4-8 students increased from 84.1 percent of the state norm in 1991-93 to 104.4 percent of the state norm in 1997-99. The school system's average ACT scores in science reasoning went from 18.8 in 1995-96 to 19.1 in 1998-99. While there are instances of progress in science test scores, there are instances of decline as well.

It was noted that Title I programs concentrate on mathematics and reading. This apparently has spawned more awareness of the importance of math and reading on the part of the involved students, their parents, and their teachers.

Progress in the Elementary Schools

Table 1 was constructed to summarize the value-added testing information from the 9 schools with K-8 students in the Cocke County school district for the years 1997, 1998, and 1999 in the areas of mathematics, science, reading, language arts, and social studies. The summary sheets provided to us did not make clear the grade levels tested, but we assume them to be grades 4-8. For each school, there were 2 possible gains—1997 to 1998 and 1998 to 1999—in each subject matter area. Each school's 3 gain scores in each subject matter area could also be looked at in comparison with the average statewide gain for the same years, which the state set at 100. We assume that each score for a school essentially represents the percentage of the state average gain score that the school attained.

The following main findings are drawn from Table 2:

1. Across all 9 schools, there were 6 out of 18 possible gains in mathematics over the 3-year period. This observation is at variance with the perceptions of many interviewees that there have been recent gains in mathematics. In fact, only 3 schools (Del Rio, Edgemont, and Smoky Mountain) showed gains in mathematics average gain scores from 1998 to 1999.

2. Across the 3 years, there were only 5 out of a possible 27 instances of school gain scores in math exceeding the state average. Only 2 of those gain scores occurred in 1999 (for Del Rio and Centerview Schools). Mathematics is an area that requires improvement in most of the schools in the district, the exceptions appearing to be the Del Rio and Centerview Schools. The finding concerning the need to strengthen teaching and learning in mathematics agrees with the statements of interviewees across the district.

3. Across all 9 schools, there were 9 out of 18 possible gains in science average gain scores over the 3-year period. Unfortunately, 8 of these gains were from 1997 to 1998, with only 1 (for the Del Rio School) appearing from 1998 to 1999. All the other schools showed declines in their gain scores in science from 1998 to 1999.

4. The good news in science is that, across the 3 years, there were 19 out of a possible 27 instances of school gain scores exceeding the state average. Clearly, science is an area of relative strength in the Cocke County elementary schools, though there is room for improvement. The Northwest School lags considerably behind the other schools in the district and behind state average gains in science, which is understandable, given Northwest's student population.

Table Two

Cocke County: TVAAS Report
(probably grades 4-8)

		Cosby	Del Rio	Edgemont	Grassy Fork	Northwest	Parrottsville	Smoky Mountain	Centerview	Bridgeport
Math										
(1)	1997	89.0	92.2	89.5	96.4	72.1	80.3	97.8	98.0	(100.1)
(2) ↗3	1998	76.2 ↘	76.8 ↘	73.1 ↘	(114.4) ↗	54.5 ↘	82.6 ↗	69.0 ↘	(127.1) ↗	89.1 ↘
(2) ↗3	1999	74.5 ↘	(100.2) ↗	82.8 ↗	85.8 ↘	46.6 ↘	79.5 ↘	79.0 ↗	(124.5) ↘	74.8 ↘
(5) ↗6										
Science										
(4)	1997	(103.8)	(109.6)	85.8	(112.9)	54.5	94.9	(106.6)	89.1	86.4
(8) ↗8	1998	(126.9) ↗	(101.2) ↘	(103.9) ↗	(141.1) ↗	86.5 ↗	(115.9) ↗	(119.7) ↗	(131.4) ↗	(150.0) ↗
(7) ↗1	1999	(116.9) ↘	(126.6) ↗	96.7 ↘	(113.9) ↘	74.4 ↘	(100.4) ↘	(109.7) ↘	(115.1) ↘	(107.6) ↘
(19) ↗9										
Reading										
(6)	1997	(100.6)	(110.7)	(113.9)	(107.1)	82.3	95.3	96.5	(107.6)	(102.8)
(9) ↗7	1998	(105.2) ↗	(107.4) ↘	(101.3) ↘	(120.8) ↗	(100.6) ↗	(119.2) ↗	(101.6) ↗	(125.5) ↗	(114.3) ↗
(6) ↗1	1999	(105.2) ↔	(106.9) ↘	94.6 ↘	(103.7) ↘	84.5 ↘	(100.7) ↘	(114.9) ↗	(122.7) ↘	91.5 ↘
(21) ↗8										
Language										
(6)	1997	(108.0)	(121.7)	99.2	(127.7)	70.3	88.3	(103.3)	(123.9)	(123.8)
(8) ↗7	1998	(104.5) ↘	(151.5) ↗	89.9 ↘	(135.7) ↗	(111.6) ↗	(105.1) ↗	(118.6) ↗	(140.9) ↗	(135.0) ↗
(6) ↗0	1999	97.0 ↘	(133.3) ↘	87.4 ↘	(126.1) ↘	(108.7) ↘	(101.9) ↘	(105.1) ↘	(136.7) ↘	92.8 ↘
(20) ↗7										
Social Studies										
(0)	1997	86.1	94.9	79.9	97.3	81.1	93.4	84.0	78.1	88.3
(1) ↗3	1998	83.6 ↘	87.8 ↘	77.5 ↘	(128.4) ↗	75.0 ↘	91.8 ↘	82.7 ↘	94.6 ↗	98.8 ↗
(2) ↗4	1999	(103.5) ↗	(114.3) ↗	74.0 ↘	87.3 ↘	43.1 ↘	72.2 ↘	91.2 ↗	95.3 ↗	79.5 ↘
(3) ↗7										
		(9)* ↗3**	(11) ↗4	(3) ↗2	(11) ↗5	(3) ↗4	(6) ↗3	(8) ↗6	(10) ↗6	(7) ↗4

*Circled numbers: number of gains at or above average statewide gains

** ↗#: number of year-to-year improvements in gains

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5. Across all 9 schools, there were 8 out of 18 possible gains in reading over the 3-year period. Only 1 of those gains was from 1998 to 1999 (the Smoky Mountain School). All of the other schools showed declines in their gain scores in reading from 1998 to 1999.

6. The good news in reading is that, across the 3 years, there were 21 out of a possible 27 instances of school gain scores exceeding the state average. Reading is an area of relative strength in the Cocke County elementary schools. The Northwest School lags considerably behind the other district schools in reading and, for 2 of the 3 years, behind state average gains.

7. Across all 9 schools, there were 7 out of 18 possible gains in language arts over the 3-year period. None of those gains were from 1998 to 1999.

8. The good news in language arts is that, across the 3 years, there were 20 out of a possible 27 instances of school gain scores exceeding the state averages. Language arts seems an area of relative strength in the Cocke County elementary schools. The Edgemont School lags behind the other schools in the district and behind state average gains in language arts. Based on these results, the Edgemont School may need special assistance in language arts. It is noteworthy that the Northwest School had average gains in language arts that were above the state averages in 1998 and 1999, decided improvements over its low score of 70.3 in 1997.

9. Across all 9 schools, there were 7 out of 18 possible gains in social studies over the three-year period. Four of those gains were from 1998 to 1999.

10. The somewhat disappointing news in social studies is that, across the 3 years, there were only 3 out of a possible 27 instances of school gain scores exceeding the state average. Based on these findings, social studies appears to be an area of relative weakness in the Cocke County elementary schools. The Cosby and Del Rio Schools are exceptions, in that they both showed gains from 1998 to 1999 and both had average gain scores above the state average. The decline of average gain scores in social studies for the Northwest School of 81.1 for 1997, 75 for 1998, and 43.1 for 1999 is worrisome.

The column totals in Table 2 may be instructive for comparing the performances of the 9 schools. When comparing all 15 average gain scores for each school to the 15 state average gain scores, 4 schools stand out as relatively strong: Del Rio (11 out of 15 scores exceeding the state averages), Grassy Fork (11 out of 15 scores exceeding the state averages), Centerview (10 out of 15 scores exceeding the state averages), Cosby (9 out of 15 scores exceeding the state averages), and Smoky Mountain (8 out of 15 scores exceeding the state averages). Edgemont and Northwest each had only 3 of 15 scores exceeding the state averages.

When looking at the 10 possible year-to-year gains in average gain scores for each school, it is seen that Grassy Fork (5 out of 10 year-to-year gains), Smoky Mountain (6 out of 10), and

Centerview (6 out of 10) did best. Edgemont School made year-to-year gains in only 2 out of 10 possibilities.

Combining results for all 9 (Grade 4 - 8) school groups, the Cocke County *Report Card* for 1998-99 provided an overall summary of Comprehensive Assessment Program Value Added Three Year Averages in comparison to the nation. The results are seen in Table 3. The system's 3-year gains in reading, language, and science exceeded comparable average gains derived from national norms on the statewide achievement tests. The system's 3-year gains in mathematics and social studies were below comparable average gains derived from national norms on the statewide achievement tests.

Table 3

Comprehensive Assessment Program Value Added Three Year Average						
	System			State		
(Grades 4-8)	1991-93	1997-99	Gain vs. Nation	1991-93	1997-99	Gain vs. Nation
Mathematics	89.6%	83.9%	Below	94.3%	100.1%	Above
Reading	90.5%	102.5%	Above	102.9%	116.8%	Above
Language Arts	102.8%	108.8%	Above	112.9%	114.5%	Above
Social Studies	98.0%	84.3%	Below	96.3%	103.9%	Above
Science	84.1%	104.4%	Above	94.3%	117.1%	Above

High School Achievement Results

Table 4 is taken from the Cocke County *Report Card* for 1998-99. It provides high school subject matter three year average value added data for pre-algebra, algebra I, algebra II, geometry, and mathematics for Tech I. The high school subject matter, 3-year average value-added average gains for the system are all below the state mean score gains, except for the area of mathematics for Technology I. The preponderance of evidence in the math area suggests that the district is right to place a high priority in improving mathematics instruction at all grade levels.

Table 4

High School Subject Matter Three Year Average Value Added				
1996-98				
(scale 1-999)	**Expected**	**Actual**	**Gain vs. State**	**State Mean Score**
Pre-Algebra	475	461	Below	470
Algebra I	513	499	Below	517
Algebra II	533	508	Below	539
Geometry	506	499	Below	511
Math for Tech I	509	506	Below	503

Writing Assessments for Elementary and Secondary Levels

Staff members observed that students' writing performance has substantially improved. Table 5, taken from the Cocke County *Report Card* for 1998-99, confirms system personnel's judgments that writing performance has been improving in the system. Whereas only 8.9 percent of grade 4 students passed the competent level on the writing exam in 1994-95, 56.4 percent passed in 1998-99 (still slightly below the state average). For grade 11, 19.7 percent passed in 1994-95 compared with 75.1 percent in 1998-99 (the latter being well above the state average). It was said that there has been more staff development in the writing area, more after-school work, and also school-based after-school work that is focused on staff development and helping students to improve their writing.

Table 5

Writing Assessment–Percent Competent or Above				
	System		**State**	
	1994-95	**1998-99**	**1994-95**	**1998-99**
Grade 4	8.9%	56.4%	16.3%	59.2%
Grade 7	n/a	53.8%	n/a	52.0%
Grade 11	19.7%	75.1%	30.3%	59.5%

Generally, it seemed that the school personnel who presented achievement information to us had overly optimistic impressions of their understanding of the information. The achievement data we saw suggested that over the last five years there has been a gain in the writing performance of students, but no clear trend was evident in other subject matter areas. (The gains in writing are so great that one suspects a different overall basis for determining competence.) The achievement data we saw in math, science, and other areas seem to be comparable, and thus quite good, to data from the rest of the state.

While not directly attributed to the school system's involvement in systemic reform or ARSI, it is noted that 10 graduating seniors from Cocke County High School and 5 from Cosby High School were among the 366 seniors designated as Academic Achievers for 2000. Students receiving this recognition are the "top graduating students in East Tennessee, based on grade point averages from 64 area high schools." This recognition program was started 16 years ago, and it continues to function with the support and leadership of *The News-Sentinel*.

Summary and Conclusions

Based on a set of indicators for each driver that was developed and validated by the Resource Advisory Team of the NSF RSI evaluation study being conducted by The Evaluation Center at Western Michigan University, the overall rating of each driver in the Cocke County School System is shown in Table 6. The rating of each driver is a consensus based on the evidence found during the on-site study/visit and the independent ratings of the three members of the visitation team.

The ARSI program clearly seems to be a valuable supplement to this system's efforts to improve science and math teaching and learning. The teacher partners are working together. There is a good base of information and materials available from ARSI. Apparently, this is valued and used by at least some of the teachers, and system personnel view the assistance to professional development as valuable.

However, it is too much to expect that the small level of support, probably in the neighborhood of $20,000 a year, could significantly affect enrollments in science and advanced science and math courses, enrollments in science and math in college and university, test scores, graduation rates, dropout rates, and the like. There is no strong evidence that ARSI is making a large contribution to impacts in these areas. It would be unreasonable to expect that such impacts would be occurring, given the small level of investment.

Table 6

Rating of Educational System Reform Drivers

	Driver	Rating*
1.	Implementation of standards-based curriculum . . .	2-
2.	Policies supportive of quality math and science programs . . .	2
3.	Convergence and usage of resources to support math and science programs . . .	2-
4.	Broad-based support and involvement of parents and others . . .	2
5.	Accumulation of broad and deep array of evidence that the program is enhancing student achievement . . .	2
6.	Improvement in the achievement of all students, including the historically underserved . . .	2

* 0 = Not present/no evidence; 1 = Weak evidence/beginning but sporadic; 2 = Moderate evidence/developing but visible success; and 3 = Strong evidence/operationally consistent and widespread

Following the site visits to schools, the evaluation team met to identify what we would cite as the main lessons learned from our study of this school system and ARSI's involvement in the system. The points of agreement were as follows:

- The school system fits ARSI's profile for targeted schools and students. That is, it clearly is a rural school system with a high concentration of disadvantaged students and one that gives promise of profiting from the ARSI offerings.

- The community school system is engaged with reforms that are aligned with publicly endorsed standards and tests, particularly the state curriculum standards.

- Reform and improvement efforts are systemwide, and they are taken seriously.

- The system is struggling to attract and hold certified and qualified teachers without much success, especially in the areas of math and science, and this may be the strongest impediment. Qualified teachers in these areas often can easily attain higher paying jobs in other school systems or in business and industry.

- More or less, this system is giving attention to math and science. Clearly, the system is giving highest priority to mathematics.

- Technology is on the landscape of this school system, but there was not much evidence that it is being widely and substantially used.
- Curriculum reform in this system is being driven by state tests.
- ARSI has strong coordination and liaison through Peggy Hammonds and Missy Biddle.
- The community is actively engaged in relating the school to the community. Particular examples are the science fair and the street/career fair.
- There is no consistent trend of improvement in average test score gains in math and science.
- There appears to be marked improvement in students' writing performance.
- There are clear graduation requirements in the areas of math and science, as well as other areas.
- ARSI has strengthened communication across schools and within schools. There is more evidence of between-school communication being improved than of within-school communication being substantially improved.
- The teacher partners are a strong force for utilization of ARSI services and materials and for increasing and improving communication about reform and ways to reform the system.
- Another major problem in the system is the low level of aspiration for student achievement among both parents and students.
- ARSI seems to be quite well known but not fully understood among the teachers and principals across the system.
- ARSI is an excellent avenue for communication and for obtaining resources throughout the system.
- ARSI is providing workshops, materials, a web site, and curriculum audits that are valued by the people who have used them.
- ARSI is a component and a catalyst of reform, but it is not a single, powerful driver of reform.

- NSF's investment has been modest, but cost-effective.

- The central administration and school principals are supportive of ARSI.

In sum, RSI proved to be a valuable resource for this school system, and the system's personnel are making good use of the opportunities. It is significant to point out that it was reported to us that should the system not receive continued support from RSI, the superintendent plans to continue to release the system's teacher partner half time to continue working with the system's teachers. Overall, it seems that NSF's investment in ARSI is, in the case of the Cocke County School System, modest, much appreciated, well used, complementary to other reform efforts, cost-effective, and worth continuing.

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